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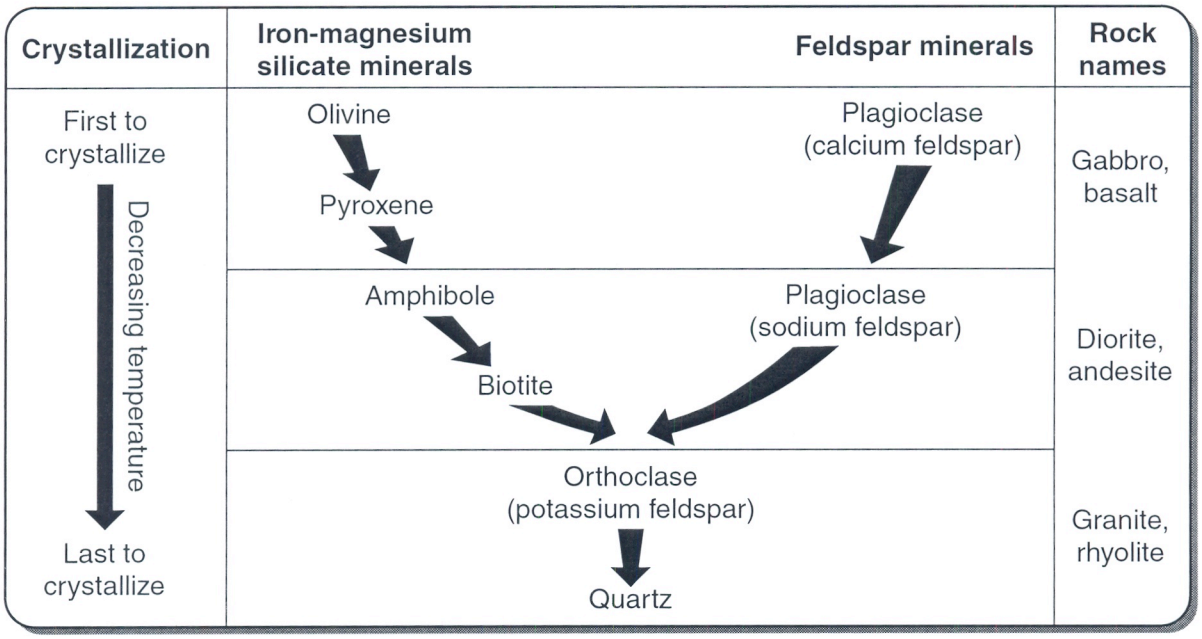
SECTION 2 Enrichment

Crystallization

Directions: *This chart represents the order in which different minerals crystallize from cooling magma or lava to form igneous rocks. Both mineral names and the rocks they form are shown. Use the chart to answer the questions.*



1. Which minerals are the first to crystallize from cooling magma?

   _____

   _____

2. What kind of rocks are formed by these minerals? _____
3. Which mineral crystallizes at the lowest temperature? _____
4. Which mineral, pyroxene or orthoclase, crystallizes from magma first? _____
5. Which feldspar mineral is found in granite? _____
6. What minerals form the rocks diorite and andesite? _____
7. Minerals higher in silica content crystallize from magma at lower temperatures. Which magma, basaltic or granitic, is higher in silica content? _____
8. Magma that is low in silica content flows more easily. Which kind of lava, basaltic or granitic, flows faster? _____

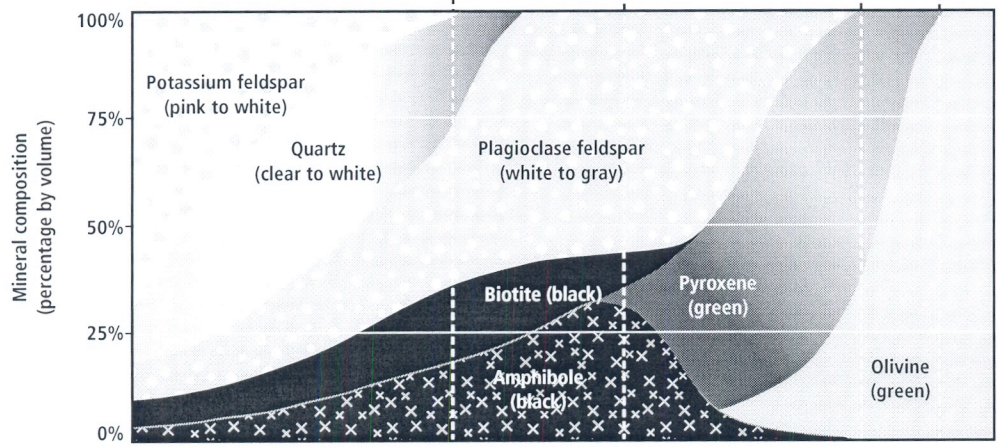
Meeting Individual Needs

Use with Chapter 5
Section 5.2

Classification of Igneous Rocks

Table 5-2 Classification of Igneous Rocks

	Felsic	Intermediate	Mafic	Ultramafic		Texture
Extrusive	Obsidian		Basaltic glass			Glassy (non-crystalline)
Extrusive	Rhyolite	Andesite	Basalt			Fine-grained
Intrusive	Granite	Diorite	Gabbro	Peridotite	Dunite	Coarse-grained
Intrusive	Pegmatite					Very coarse-grained



Name Class Date

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WORKSHEET 12 TEACHING TRANSPARENCY

Use with Chapter 5
Section 5.2

Classification of Igneous Rocks

1. What four types of igneous rocks are represented in the table and graph?

2. Use the table to compare and contrast the textures of the extrusive rocks and intrusive rocks.

3. How do basaltic glass and gabbro differ? How are they similar?

4. Which types of igneous rocks are composed of at least 50 percent olivine?

5. Use the graph to explain why felsic rocks are usually light-colored and mafic rocks are usually dark-colored.

6. How would you classify a fine-grained, igneous rock that contains approximately 25 percent amphibole, 15 percent biotite, and 60 percent plagioclase feldspar?

7. Approximately how much biotite is a sample of gabbro likely to contain?

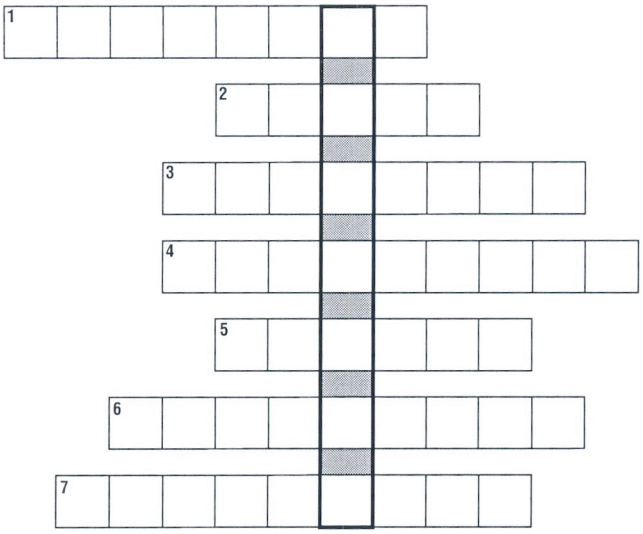
8. Which contains a greater percentage of quartz—granite or diorite?

Name Date Class

SECTION 2 Reinforcement

Igneous Rocks

Directions: *Write the term that matches each description below on the spaces provided. The boxed letters should spell the kind of rocks that form from magma.*



1. Igneous rocks that are dense and dark-colored. They form from magma that is rich in iron and magnesium and poor in silica.
2. Thick, gooey, molten material inside a volcano or deep inside Earth
3. Igneous rocks that are light-colored and have a lower density. They form from thick, stiff magma that contains lots of silica and lesser amounts of iron and magnesium.
4. Igneous rocks that have mineral compositions between those of granitic and basaltic rocks
5. One kind of volcanic glass that has holes caused by pockets of gas
6. The kind of igneous rock that forms below Earth's surface
7. The kind of igneous rock that forms on or near Earth's surface
8. Magma forms this kind of rock. _____

Meeting Individual Needs

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CHAPTER 5 STUDY GUIDE FOR CONTENT MASTERY

Igneous Rocks

SECTION 5.1 *What are igneous rocks?*

In your textbook, read about the nature of igneous rocks.
Use each of the terms below just once to complete the following statements.

extrusive **igneous rock** **intrusive**
lava **magma**

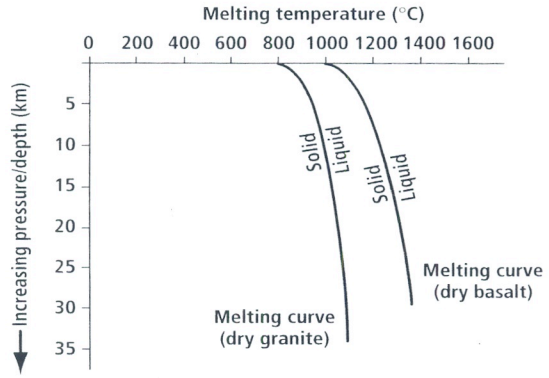
1. Molten rock inside Earth's crust is called _____.
2. A(n) _____ is formed from the crystallization of magma.
3. Magma that flows out onto Earth's surface is called _____.
4. Fine-grained igneous rocks that cool quickly on Earth's surface are called _____ igneous rocks.
5. Coarse-grained igneous rocks that cool slowly beneath Earth's surface are called _____ igneous rocks.

In your textbook, read about the composition and origins of magma.
For each statement below, write *true* or *false*.

_____ 6. Magma is often a slushy mix of molten rock, gases, and mineral crystals.
_____ 7. The elements found in magma are quite different from those found in Earth's crust.
_____ 8. Silica is the most abundant compound found in magma.
_____ 9. Magmas are classified as intrusive or extrusive.
_____ 10. In the laboratory, rocks must be heated from 8000°C to 12 000°C before they melt.
_____ 11. Heat in the upper mantle and lower crust may come, in part, from the decay of radioactive elements.

SECTION 5.1 *What are igneous rocks?, continued*

In your textbook, read about factors that affect magma formation.
Use the diagram to answer the following questions.



12. How does pressure affect the melting point of rock?

_____

13. Do all minerals have the same melting point?

_____

14. How does temperature change with depth in Earth's crust?

_____

15. How does pressure change with depth, and why?

_____

In your textbook, read about how rocks melt.
Use each of the terms below just once to complete the passage.

elements	**fractional crystallization**	**reverse**
magma	**melting points**	**partial melting**

Because different minerals have different **(16)** _____, not all parts of a rock melt at the same time. The process whereby some minerals melt at low temperatures while other minerals remain solid is called **(17)** _____. As each group of minerals melts, different **(18)** _____ are added to the magma "stew," changing its composition. When the magma cools, it crystallizes in the **(19)** _____ order of partial melting. The process wherein different minerals form at different temperatures is called **(20)** _____. As each group of minerals crystallizes, it removes elements from the remaining **(21)** _____ instead of adding new elements.

SECTION 5.1 *What are igneous rocks?, continued*

In your textbook, read about the mineral composition of igneous rocks.
Complete the table by filling in one of the following terms: *felsic, mafic, intermediate,* or *ultramafic.*

Description	Type of Igneous Rock
28. May be formed by fractional crystallization of olivine and pyroxene	
29. Contains moderate amounts of biotite, amphibole, and pyroxene	
30. Light-colored, high silica content, contains quartz	
31. Contains plagioclase, biotite, amphibole, pyroxene, and olivine	
32. Peridotite and dunites are examples.	
33. Dark-colored, low silica content, rich in iron and magnesium	
34. Diorite in an example.	
35. Gabbro is an example.	
36. Granite is an example.	
37. Low silica content, very high iron and magnesium content	

In your textbook, read about the grain size of igneous rocks.
Answer the following questions.

38. Does obsidian, a glassy rock, have a large grain size or a small grain size?

39. Is obsidian an intrusive or extrusive igneous rock? How do you know?

40. How does the texture of gabbro compare to that of obsidian?

41. Is gabbro an intrusive or extrusive igneous rock? How do you know?

SECTION 5.2 *Classifying Igneous Rocks, continued*

In your textbook, read about igneous rocks as resources.
Circle the letter of the choice that best completes the statement or answers the question.

12. Igneous rocks are strong because of their
- **a.** temperature.
- **b.** color.
- **c.** water content.
- **d.** interlocking grain textures.

13. Which of the following is one of the most durable igneous rocks?
- **a.** granite
- **b.** sandstone
- **c.** marble
- **d.** limestone

14. Igneous rocks tend to be
- **a.** radioactive.
- **b.** full of gold.
- **c.** resistant to weathering.
- **d.** vulnerable to weathering.

15. Igneous intrusions often are associated with valuable
- **a.** radioactive elements.
- **b.** ore deposits.
- **c.** oil reservoirs.
- **d.** fossil deposits

16. Ore deposits sometimes are found as a(n)
- **a.** layered intrusion.
- **b.** extrusion.
- **c.** obsidian deposit.
- **d.** molten rock.

17. Metal-rich quartz veins are formed at the end of
- **a.** volcanic eruptions.
- **b.** radioactive decay.
- **c.** magma crystallization
- **d.** the cooling of Earth's crust.

18. What are pegmatites?
- **a.** veins of extremely large-grained minerals
- **b.** magmas of differing densities
- **c.** microscopic, interlocking crystal grains
- **d.** small volcanoes

19. What are kimberlites?
- **a.** felsic rocks
- **b.** mafic rocks
- **c.** intermediate rocks
- **d.** ultramafic rocks

20. Diamonds can form only
- **a.** under very low pressure.
- **b.** under very high pressure.
- **c.** above ground.
- **d.** near radioactive elements.